

The effect of antimicrobial peptides from Antarctic fishes against some viral and bacterial fish pathogens

ShT-02.6-2

F. Buonocore^I, F. Porcelli^I, F. Massaro^I, S. Picchiotti^I, A.R. Taddei^{II}, R.L. Xiccato^{III}, L. Cortinovis^{III}, E. Fiocchi^{III}, R. Quartesan^{III}, T. Pretto^{III}, A. Toffan^{III}

^IDepartment for Innovation in Biological, Agro-Food and Forest Systems, University of Tuscia, Viterbo, Italy, ^{II}Center of Large Equipments, Section of Electron Microscopy, University of Tuscia, Viterbo, Italy, ^{III}Istituto Zooprofilattico Sperimentale delle Venezie, Legnaro (PD), Italy

The aquaculture industry represents an essential food source worldwide, accounting for about 52% of fish production. Antimicrobials are extensively used in aquaculture for growth promotion and to maintain good health of animals. Unfortunately, these resulted in the development of the antimicrobial resistance. Therefore, there is a high pressure to find alternatives that could help in manage microbial infections in aquaculture. Antimicrobial peptides are a promising solution, due to their broad spectrum of action against viruses, bacteria, fungi and parasites and their immunomodulatory properties. They are widely distributed in all organisms and primarily target the plasma membrane of pathogens with their selectivity depending on both sequence composition and membrane charge density. In this work, we investigated the capability of peptides, previously isolated from Antarctic teleosts, to target viral and bacterial fish pathogens. Specifically, virological investigations focused on Betanodavirus (NNV), Viral Haemorrhagic Septicemia Virus (VHSV) and Spring Viraemia of Carp Virus (SVCV). The Trematocine peptide was effective in reducing viral titer for both VHSV and SVCV but had no effect on NNV. It is interesting to highlight that both VHSV and SVCV are surrounded by a viral envelope, that is absent in the case of NNV. Moreover, the Chionodracine peptide, and to an even greater extent its mutant, demonstrated bactericidal and bacteriostatic activity against various bacterial strains, including *Lactococcus garvieae* and *Vibrio harveyi*, as evidenced by the obtained MIC and MBC values. TEM analysis confirmed the action of the chionodracine mutant peptide on bacterial plasma membrane. Finally, the cytotoxicity of both peptides against a fish cell line and their hemolytic activity against fish erythrocytes were evaluated. Overall, these data represent a fundamental preliminary set of information necessary to assess their possible application as novel drugs in aquaculture.